A Behavioral Framework of Mergers and Acquisitions

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【Abstract】

In mergers and acquisitions, managers of acquiring firms make deals in manners that cannot be described in a fully rational model. This note presents a simple behavioral model to analyze non-rational behaviors by managers in mergers and acquisitions.

【Key Words】

mergers and acquisitions, behavioral finance

1. Introduction

Mergers and acquisitions are a form of corporate investments. Rational managers would go ahead for deals if discounted present values of targets are expected to exceed prices they finally pay to targets' shareholders (plus miscellaneous costs). In real-world situations, however, some aspects of observations often contradict with implications derived from fully rational models. For example, Roll (1986) suggests that acquirers' managers are mostly optimistic and overconfident in evaluating value creation from their deals. Some researches, such as Micthell and Mulherin (1996), report that mergers and acquisitions have occurred in clusters and attribute their causes to non-fundamental factors (see Shleifer and Vishny (2003). Also, see Hartford (2005) for a contrary view). It is also documented in Jensen and Ruback (1983) that a large fraction of gains from mergers and acquisitions accrues to shareholders of acquired targets, not those of acquirers, which would not have rational managers finalize deals.These observations suggest that managers are not rational, at least to a certain degree. This note proposes a model to analyze actual actions of managers in mergers and acquisitions in a framework of behavioral finance. Behavioral finance assumes that managers are not fully rational, at least on one occasion or another, and cognitively biased in a systematic way (see Baker and Wurgler (2007) for a survey of behavioral corporate finance). In this note, we provide a simple behavioral model to analyze non-rational decisions made by managers in mergers and acquisitions, which fits observations of real-world situations more that we would expect in rational models.

2. A Model

We use a model in which a manager maximizes fundamental value of a firm and gain from

financing. The fundamental value is output minus capital invested in production. Output is produced with labor L and capital K. The manager varies K to maximize the fundamental value. Putting aside the fact that mergers and acquisitions are lump sum, we model them as a continuous variable of investment in K. L is fixed so that it is omitted from the model. Assuming that the production function f(.) is increasing and concave in K, the fundamental value is

$$f(K) - K$$

where output is measured in the same unit of K.

The cognitively biased manager misperceives the fundamental value by the degree of λ. The misperceived fundamental value is written as

$$\lambda[f(K) - K]$$

The manager finances the investment by issuing equity or debt. In a fully rational model, capital structure does not have any impact on the firm's value and the manager pays no attention to financing decisions. If the assumption of rationality is relaxed, however, financing matters so that the manager's perception to valuation of the firm's equity and debt in the financial market has consequences for his investment and financing decisions.

The manager misperceives that the firm's equity is mispriced in the financial market by a factor of γ_e. Then, the misperceived gain from equity financing is

$$\gamma_e e - e$$

where e is the number of equity newly issued.

Similarly, the misperceived gain from debt financing is

$$\gamma_b b - b$$

where b is the number of debt newly issued.

Combining all these together, the manager has the following objective function：

$$max\ \lambda[f(K) - K] + \{\gamma_e e - e - c_e(e)\} + \{\gamma_b b - b - c_b(b)\}$$

where $c_e(e)$ and $c_b(b)$ are the cost functions of issuing equity and debt, respectively.

We impose a restriction e + b = K, which excludes the case that the manager maximizes the objective function simply from issuing overvalued or repurchasing undervalued equity and debt.

The manager maximizes this with respect K, e, and b. The first order conditions are

$$\lambda f'(K) + \gamma_e - 1 = \lambda + c_e'(e)$$

$$\lambda f'(K) + \gamma_b - 1 = \lambda + c_b'(b)$$

The left-hand sides of the equations are the perceived marginal gains from investing in K. The right-hand sides are the perceived marginal costs of capital investment and financing.

3. Implications

To derive implications from the model, we make simplifying assumptions on functional form. The production function f(K) is assumed to be the Cobb-Douglus function AK^{α}, where A is a shift parameter and $0 < \alpha < 1$. The cost functions $c_e(e)$ and $c_b(b)$ are assumed to

be quadratic, $2w_e^2$ and $2w_b^2$, where w_e and w_b determine the curvature of the cost functions. With these functional forms, the first-order conditions are rewritten as

$$\lambda\alpha A(e+b)^{\alpha-1} + \gamma_e - 1 = \lambda + 2w_e e$$

$$\lambda\alpha A(e+b)^{\alpha-1} + \gamma_b - 1 = \lambda + 2w_b b$$

We numerically solve these nonlinear equations under some parametric values ($\alpha = 1/3$, $A = 1$ *and* $w_e = w_b = 1/2$) .

Figure 1 shows how a change in λ affects e and b ($\gamma_e = \gamma_b = 1$). Shifting from a bold to a dotted line, λ rises from 1 to 1.5; the manager overvalues returns from mergers and acquisitions by 50% while he or she has no misperception in financing. e and b both increase from 0.0851 to 0.0883 by the same proportion. Adding up e and b, K increases from 0.1702 to 0.1766 by 3.8%.

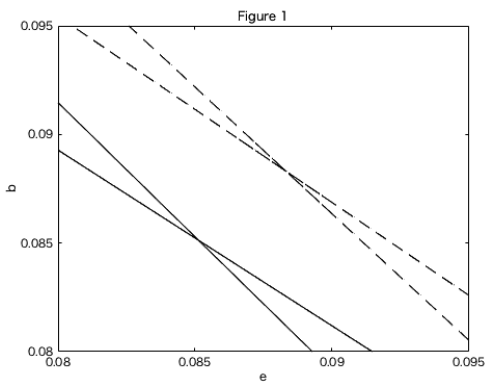


Figure 2 shows how a change in γ_e affects e and b ($\lambda = \gamma_b = 1$). Shifting from a bold to a dotted line, γ_e rises from 1 to 1.5; the manager misperceives that the firm's equity is overvalued by 50% in the financial market (the figure shows only a dotted line for the second equation which remains unchanged after the parametric value changes). e rises from 0.0851 to 0.3688 by 333.4% while b falls from 0.0851 to -0.01312; the manager buys back outstanding debt and replacing them with equity. In total, K increases from 0.1702 to 0.2376 by about 39.6%.

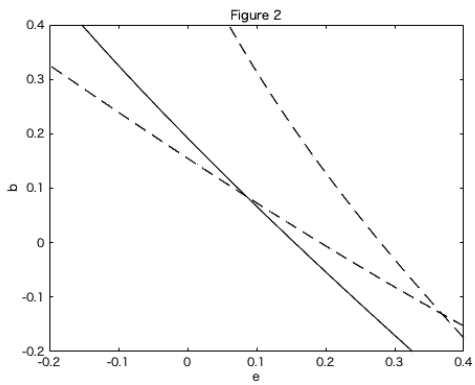
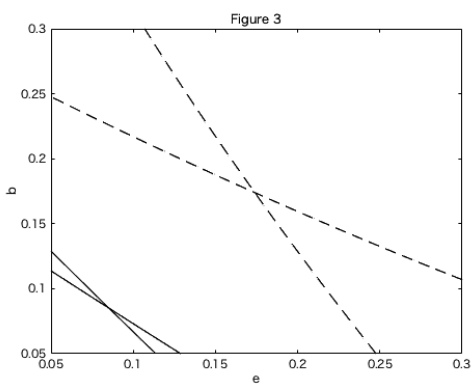


Figure 3 shows how simultaneous changes in λ, γ_e and γ_b affect e and b. Shifting from a bold to a dotted line, λ, γ_e and γ_b all rise from 1 to 1.5. e and b both rises from 0.0851 to 0.1444 by the same proportion. Summing up, K increase from 0.1702 to 0.2888 by about 69.7%.



4. Concluding Remarks

It has been widely observed that mergers

and acquisitions occur in clusters when the economy is "hot" in booms. This note has analyzed a behavioral model that is more in line with this observation than rational models. The manager's cognitive bias, amplified in economic booms, might lead to overvaluations to their firsm. This has been illustrated as a shift in λ in Figure 1. More importantly, the model has implied that their misperceptions in their securities, represented as shifts in γ_e and γ_b in Figure 2, are quantitatively large enough to induce them to act without any structural changes in industries and regulations.In concluding, a limitation of our analysis should be borne in mind. The model has assumed that investment is a continuous variable although mergers and acquisitions are "discrete". In addition, the model is static. These assume away a possibility that a manager waits in times of financial distress and deals "surge up" in booms. Discreteness and dynamics are not easily dealt with in this simple framework, and should be incorporated in future research.

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